

## C L A I M S

1. An apparatus for ionizing and separating a gas into gas components in an inlet gas, comprising:

5 a chamber structure configured to defining a flowing channel, which has an inlet port and first and second outlet ports;

an ionizer for ionizing gas components in the gas flowing into the flow channel via the inlet port;

10 means for applying an electrical field to the ionized gas components in the flow channel to separate the gas components into a cation and anion, thereby separating gas molecule components contained in the gas;

15 means for extracting one of the gas components from the first outlet port, and extracts the another of the gas components from the second outlet port: and

control means for controlling a flow of the inlet gas from the inlet port and retaining the gas in the flow channel for a predetermined time period and more.

20 2. The apparatus according to claim 1, wherein the controlling means includes a flow resisting part, which are disposed in each of the first and second outlet ports.

25 3. The apparatus according to claim 1, wherein the controlling means includes a flow resisting part to allow the gas component to flow out of the flow channel, and applying means includes first and second

electrodes disposed in the first and second outlet ports, respectively, and disposed opposite to each other to separate the gas components into a cation and anion so that gas molecule component contained in the gas are separated.

4. The gas ionization/separation apparatus according to claim 3, wherein the first and second outlet ports are provided with first and second porous electrode formed of a porous member as a part of the first and second electrodes, respectively, and the one gas component and the other gas component are passed through the first and second porous electrodes and the flow resisting part, and are extracted from the first and second outlet ports, respectively.

5. The apparatus according to claim 2, wherein the resisting part are detachably provide in front of the outlet ports, respectively.

6. The apparatus according to claim 1, wherein the controlling means allows the gas component to flow in along an inner peripheral surface of the flow channel from the inlet port, and forms a circular flow in the flow channel, so that the inlet gas flow is retained in the flow channel.

7. The apparatus according to claim 1, wherein the flow channel is molded in a cylindrical shape, the inlet port is disposed in a side surface portion of the cylindrical flow channel, and the first and second

outlet ports are disposed opposite to each other in opposite ends of the cylindrical flow channel.

8. The apparatus according to according to claim 1, wherein the ionizer includes a plurality of ion sources for ionizing the gas component.

9. The apparatus according to claim 1, wherein the controlling means includes a pressure measurement portion configured to measures a pressure of an outflow gas, and a flow volume adjuster configure to adjust the flow volume of the gases extracted from the respective first and second outlet ports based on a pressure difference between the gas components measured in the first and second outlet ports.

10. The apparatus according to any one of claim 1, further comprising:

means for changing polarity of the electrode which applies the electrical field and means for changing electrical field strength of the electrode.

11. The apparatus according to any one of claim 1, further comprising:

means for changing polarity of the electrode which applies the electrical field.

12. The apparatus according to any one of claim 1, further comprising means for changing electrical field strength of the electrode.

13. The apparatus according to claim 1, further comprising: temperature measurement means for measuring

a temperature of the gas in the flow channel so that an optimum separation voltage is applied in accordance with the measured gas.

14. The apparatus according to claim 1, further  
5 comprising: pressure measurement means for measuring a pressure of the gas as a gas state in the flow channel so that an optimum separation voltage is applied in accordance with the measured gas component.

15 15. The apparatus according to claim 1, further comprising: temperature measurement means for measuring the temperature of the gas in the flow channel so that the gas state is adjusted to have an optimum temperature in accordance with the applied separation voltage.

15 16. The apparatus according to claim 1, further comprising: pressure measurement means for measuring the pressure of the gas as a gas state so that the gas state is adjusted to have an optimum pressure in accordance with the applied separation voltage.